1. A process for optimizing transmission speeds on a distributed transmission system which can support multiple upstream channels or logical channels simultaneously, comprising:

1) gathering data about each cable modem (CM) in a group of CM coupled to a a cable modem termination system (CMTS) through a distributed transmission system;

2) dividing said group of CMs up into logical groups based upon CM type and/or throughput ability;

3) creating an upstream channel or logical channel on said distributed transmission system for each logical group of CMs, each upstream channel having transmission characteristics optimized for a particular logical group of modems; and

4) assigning the modems in each logical group to the upstream channel created for that logical group.

2. The process of claim 1 further comprising the steps of monitoring the bit error rate of transmissions from each CM, and if the bit error rate of any CM becomes too high or too low relative to underperformance and overperformance standards, respectively, sending a message to said CM whose bit error rate has become too high or too low causing each said CM which is overperforming or underperforming to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for more efficient communications of digital data between said CMTS and said CM.

3. The process of claim 1 further comprising the steps of monitoring the byte error rate of transmissions from each CM, and if the byte error rate of any

CM becomes too high or too low relative to underperformance and overperformance standards, respectively, sending a message to said CM whose byte error rate has become too high or too low causing each said CM which is overperforming or underperforming to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for more efficient communications of digital data between said CMTS and said CM.

4. The process of claim 1 further comprising the steps of monitoring the packet error rate of transmissions from each CM, and if the packet error rate of any CM becomes too high or too low relative to underperformance and overperformance standards, respectively, sending a message to said CM whose packet error rate has become too high or too low causing each said CM which is overperforming or underperforming to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for more efficient communications of digital data between said CMTS and said CM.

5. The process of claim 1 further comprising the steps of monitoring the signal-to-noise ratio (SNR) of transmissions from each CM, and if the SNR of any CM becomes too high or too low relative to underperformance and overperformance standards, respectively, sending a message to said CM whose SNR has become too high or too low causing each said CM which is overperforming or underperforming to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for more efficient communications of digital data between said CMTS and said CM.

6. The process of claim 1 further comprising the steps of monitoring the received power of transmissions from each CM, and if the received power of any

CM at said CMTS becomes too high or too low relative to underperformance and overperformance standards, respectively, sending a message to said CM whose received power has become too high or too low causing each said CM which is overperforming or underperforming to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for more efficient communications of digital data between said CMTS and said CM.

7. The process of claim 1 wherein step 1 comprises gathering data about each modem's throughput ability by monitoring post registration upstream CM data transmissions and determining the value for one or more of a plurality of factors that indicate whether each said CM is overperforming or underperforming the burst profile and throughput ability of the upstream channel upon which said CM is transmitting, said factors including RS codeword error rate, SNR, received power, bit error rate, byte error rate and/or packet loss rate, and creating and directing said overperforming CMs to transmit upstream on one or more new upstream channels with burst profiles which are suitable for more efficient communication upstream by said overperforming CMs, and creating and directing said underperforming CMs to transmit upstream on one or more new upstream channels with burst profiles which are suitable for more efficient communication upstream by said underperforming CMs.

8. The process of claim 1 wherein step 1 comprises gathering data about each modem through a registration process and wherein step 2 comprises dividing modems into logical groups by modem type as learned from said registration process, and wherein step 1 further comprises gathering data about each modem's throughput ability by monitoring post registration data transmissions and determining the value for one or more of a plurality of factors that indicate

whether said modem is overperforming or underperforming the burst profile and throughput ability of the upstream upon which said modem is transmitting, and wherein step 2 further comprising subdividing any logical group with one or more modems which are overperforming or underperforming into overperforming and underperforming logical subgroups, and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said overperforming modems and wherein step 4 further comprises assigning said overperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said overperforming modem(s), and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said underperforming modems, and wherein step 4 further comprises assigning said underperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said underperforming modem(s).

9. The process of claim 1 wherein step 1 comprises gathering data about each modem through a registration process and wherein step 2 comprises dividing modems into logical groups by modem type as learned from said registration process with DOCSIS 1.0 modems in one logical group and DOCSIS 1.1 modems in another logical group and DOCSIS 2.0 modems in a third logical group operating in SCDMA or ATDMA mode only, each logical group having created for it an upstream having a burst profile suited to the throughput ability and modulation profile of the modems in said logical group in step 3, and all modems in each logical group being assigned in step 4 to an upstream having a burst profile tailored to the modems in said logical group, and wherein step 1 further comprises gathering data about each modem's throughput ability by monitoring post registration data transmissions and determining the value for one or more of a

plurality of factors that indicate whether said modem is overperforming or underperforming the burst profile and throughput ability of the upstream upon which said modem is transmitting, and wherein step 2 further comprising subdividing any logical group with one or more modems which are overperforming or underperforming into overperforming and underperforming logical subgroups, and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said overperforming modems and wherein step 4 further comprises assigning said overperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said overperforming modem(s), and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said underperforming modems, and wherein step 4 further comprises assigning said underperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said underperforming modem(s).

10. The process of claim 1 wherein step 1 comprises gathering data about each modem through a registration process and wherein step 2 comprises dividing modems into logical groups by modem type as learned from said registration process with DOCSIS 1.0 modems in one logical group and DOCSIS 1.1 modems in another logical group and DOCSIS 2.0 modems grouped into a logical group operating in SCDMA mode only and/or a logical group operating in ATDMA mode only, each logical group having created for it an upstream channel having a burst profile suited to the throughput ability and modulation profile of the modems in said logical group in step 3, and all modems in each logical group being assigned in step 4 to an upstream having a burst profile tailored to the modems in said logical group, and wherein step 1 further comprises gathering data about each modem's throughput ability by monitoring post registration data transmissions and

determining the value for one or more of a plurality of factors that indicate whether said modem is overperforming or underperforming the burst profile and throughput ability of the upstream channel upon which said modem is transmitting, and wherein step 2 further comprising subdividing any logical group with one or more modems which are overperforming or underperforming into overperforming and underperforming logical subgroups, and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said overperforming modems and wherein step 4 further comprises assigning said overperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said overperforming modem(s), and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said underperforming modems, and wherein step 4 further comprises assigning said underperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said underperforming modem(s).

11. The process of claim 1

wherein step 1 comprises gathering data about each modem through an initial ranging process and a registration process,

and wherein step 2 comprises dividing modems into logical groups by modem type as learned from said registration process with DOCSIS 1.0 modems in one logical group and DOCSIS 1.1 modems in another logical group and DOCSIS 2.0 modems in a third logical group operating in SCDMA mode only or ATDMA mode only,

and wherein each logical group has created for it an upstream having a burst profile suited to the throughput ability and modulation profile of the modems in said logical group in step 3,

and wherein all modems in each logical group being assigned in step 4 to an upstream channel having a burst profile tailored to the modems in said logical group,

and wherein step 1 further comprises gathering data about the received signal power and/or signal-to-noise ratio (SNR) of initial ranging transmissions, and if any modem has inadequate received signal power and/or signal to noise ratio after a plurality of attempts to correct the problem, dividing said modems into one or more low power and/or high power subgroups and/or one or more low SNR and/or high SNR subgroups in step 2 and creating one or more lower throughput, more robust upstream channels for each low power and/or low SNR subgroup in step 3 and sending messages to said modems that have low power and/or low SNR directing said modems to switch to said one or more lower throughput, more robust upstream channels, each lower throughput, more robust upstream channel having a burst profile tailored to achieve reliable communications with said modems in said low power and/or low SNR subgroup assigned to said lower throughput, more robust upstream channel such that registration can be completed, and creating one or more higher throughput, less robust upstream channels for each high power and/or high SNR subgroup in step 3 and sending messages to said modems that have high power and/or high SNR directing said modems to switch to said one or more higher throughput, less robust upstream channels, each higher throughput, less robust upstream channel having a burst profile tailored to achieve reliable communications with said modems in said high power and/or high SNR subgroup assigned to said higher throughput, less robust upstream channel such that registration can be completed;

and wherein step 1 further comprises gathering data about each modem's throughput ability by monitoring post registration data transmissions and determining the value for one or more of a plurality of factors that indicate whether said modem is overperforming or underperforming the burst profile and throughput ability of the upstream upon which said modem is transmitting,

and wherein step 2 further comprising subdividing any logical group with one or more modems which are overperforming or underperforming into overperforming and underperforming logical subgroups,

and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said overperforming modems,

and wherein step 4 further comprises assigning said overperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said overperforming modem(s),

and wherein step 3 further comprises creating one or more upstream channels with burst profiles tailored to the throughput ability of said underperforming modems,

and wherein step 4 further comprises assigning said underperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said underperforming modem(s).

12. The process of claim 11 further comprising the step of continuing to monitor post registration data communications and determining the values of one or more factors that indicate whether a modem is overperforming or underperforming, and if any modem is overperforming or underperforming its upstream channel's throughput ability, creating a new logical subgroup and new

upstream channel for said modem and assigning said modem to transmit on said new upstream channel, said new upstream channel having a burst profile tailored to make efficient use of the throughput ability of said modem.

13. A process for optimizing transmission speeds on a distributed transmission system which can support multiple upstream channels simultaneously and which has a plurality of cable modems coupled to said distributed system, each having different upstream transmission modes, comprising:

transmitting one or more DOCSIS downstreams from a cable modem termination system (CMTS);

for each DOCSIS downstream, transmitting:

an upstream channel descriptor message which establishes a DOCSIS 1.0 upstream;

an upstream channel descriptor message which establishes a DOCSIS 2.0 SCDMA or DOCSIS 2.0 ATDMA upstream;

receiving initial ranging bursts from each of a plurality of cable modems (CM) and processing said bursts to conduct initial training of each CM which transmitted an initial ranging burst, and sending downstream messages to each CM to cause any needed adjustments in power, frequency, timing and/or equalization coeffients;

receiving registration transmissions from each CM which has successfully completed initial ranging, and determining the type of each CM from registration data;

creating a separate logical group for all DOCSIS 1.1 CMs and one or more separate 1.1 upstream channels for said DOCSIS 1.1 cable modems, each said 1.1 upstream channel having a burst profile tailored for the

throughput ability of DOCSIS 1.1 CMs and linked to a downstream to which a DOCSIS 1.1 CM is tuned, and sending downstream messages to each DOCSIS 1.1 CM causing each DOCSIS 1.1 CM to switch to an 1.1 upstream channel linked to the downstream to which said CM is tuned.

14. The process of claim 13 further comprising the steps of monitoring the received power of each CM during initial training thereof, and, for any CM which has inadequate received power after a plurality of attempts to adjust transmit power of said CM have failed to cause said CM's signal to arrive at said CMTS with adequate received power, causing said CM to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for adequate communications of digital data between said CMTS and CM despite said power shortfall problem.

15. The process of claim 13 further comprising the steps of monitoring the received power of each cable modem in each logical group during initial training, and, if the received power from a CM is not adequate after a predetermined number of tries to adjust the transmit power of said CM, then concluding said CM has a power shortfall problem and either creating a low power, more robust upstream channel with a burst profile suitable to allow adequately reliable reception from said CM with said power shortfall problem and sending a message to said CM with said power shortall problem so as to cause said CM with said power shortfall problem to switch to said low power, more robust upstream channel, or sending a message to said CM with said power shortfall problem so as to cause it to switch to a low power, more robust upstream channel which already exists and which is compatible with the type of DOCSIS modem said CM with said

power shortfall problem is and which is linked to a downstream to which said CM with said power shortfall problem is tuned.

16. The process of claim 13 further comprising the steps of monitoring the signal to noise ratio of transmissions from each CM during initial training of said CM, and if the signal to noise ratio of any CM is still unacceptable after multiple attempts to complete initial training, sending a message to said CM whose signal to noise ratio has become unacceptable causing said CM to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for adequate communications of digital data between said CMTS and CM despite said inadequate signal to noise ratio problem.

17. A process for optimizing transmission speeds on a distributed transmission system which can support multiple upstream channels simultaneously and which has a plurality of cable modems coupled to said distributed system, each having different upstream transmission modes, comprising:

transmitting one or more DOCSIS downstreams from a cable modem termination system (CMTS);

for each DOCSIS downstream, transmitting:

an upstream channel descriptor message which establishes a DOCSIS 1.0 upstream;

an upstream channel descriptor message which establishes a DOCSIS 1.1 upstream;

an upstream channel descriptor message which establishes a DOCSIS 2.0 upstream operating in SCDMA or TDMA mode;

receiving initial ranging bursts from each of a plurality of cable modems (CM) and processing said bursts and sending downstream messages to each CM to cause any needed adjustments in power, frequency, timing and/or equalization coeffients;

receiving registration transmissions from each CM which has successfully completed initial ranging, and determining the type of each CM from registration data and sending any necessary downstream messages to any CM that is transmitting on an upstream not having a burst profile optimized for the modulation profile of said CM causing said CM to move to an upstream having a burst profile optimized for the CM's modulation profile;

monitoring the received power of each CM during initial training thereof, and determining any CM which has inadequate received power or inadequate signal-to-noise ratio after a plurality of attempts to adjust transmit power of said CM have failed to cause said CM's signal to arrive at said CMTS with adequate received power or adequate signal to noise ratio;

sending a downstream message to each CM which has inadequate received signal power or signal-to-noise ratio to cause said CM to switch to a lower throughput upstream channel with a burst profile which is compatible with the CM type and suitable for adequate communications of digital data between said CMTS and CM despite inadequate received signal power or inadequate signal-to-noise ratio.

18. The process of claim 17 further comprises the steps of gathering data about each modem's throughput ability by monitoring post registration data transmissions and determining the value for one or more of a plurality of factors that indicate whether said modem is overperforming or underperforming the burst

profile and throughput ability of the upstream upon which said modem is transmitting, and further comprising the step of subdividing any logical group with one or more modems which are overperforming or underperforming into overperforming and underperforming logical subgroups, and further comprising the step of creating one or more upstream channels with burst profiles tailored to the throughput ability of said overperforming modems, and further comprising the step of assigning said overperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said overperforming modem(s), and further comprising the step of creating one or more upstream channels with burst profiles tailored to the throughput ability of said underperforming modems, and further comprising the step of assigning said underperforming modems to an upstream channel with a burst profile tailored to the throughput ability of said underperforming modem(s).

19. A process for optimizing transmission speeds on a distributed transmission system which can support multiple upstream channels simultaneously and which has a plurality of cable modems coupled to said distributed system, each having different upstream transmission modes, comprising:

transmitting one or more DOCSIS downstreams from a cable modem termination system (CMTS);

for each DOCSIS downstream, transmitting:

an upstream channel descriptor message which establishes a DOCSIS 1.0 upstream;

an upstream channel descriptor message which establishes a DOCSIS 2.0 upstream;

receiving initial training bursts from each of a plurality of cable modems (CM) and deducing the cable modem type from the upstream upon

which each said initial training burst was received thereby creating defacto logical groups of cable modems grouped by modem type.

receiving registration communications from each CM;

after registration, receiving upstream data transmissions from each CM;

monitoring one or more of the following parameters of communication of data from each CM: the received power; the signal to noise ratio; the bit error rate; the byte error rate; the Reed-Solomon codeword error rate; and the packet error rate;

if performance of any CM becomes either too good or too bad, as measured by comparing the monitored parameter for said CM to limits that establish what performance level is too good or too bad, sending a message to said CM to cause it to change to an upstream channel which has a burst profile which is suitable for the CM's performance.

20. An apparatus comprising:

any DOCSIS compatible cable modem termination system having a control computer programmed to carry out a process comprising the steps:

receiving in a cable modem termination system (CMTS) registration messages from each cable modem coupled to said CMTS and determining the modem type from each registration message;

in said cable modem termination system assigning each cable modem to a group based upon the modem type with DOCSIS 1.0 compliant modems in a first group, DOCSIS 1.1 compliant modems in a second group, DOCSIS 2.0 compliant modems in a third group;

in said cable modem termination system, generating and transmitting downstream to all said cable modems a plurality of Upstream Channel Descriptor (UCD) messages, each UCD message establishing a logical upstream channel to which one of the groups of modems will be assigned and defining a burst profile for said logical upstream channel which is appropriate for the group of modems that will be assigned to transmit on that upstream logical channel;

generating in said cable modem termination system and transmitting to each said cable modem which has registered a message which tells each cable modem the upstream logical channel to which it has been assigned.

21. The apparatus of claim 20 wherein said control computer is further programmed to carry out the steps of:

1) monitoring the received power from each cable modem in a group;

2) if the received power at said CMTS is less than a required value for a cable modem, commanding said cable modem to increase its transmit power in a downstream message and repeating steps 1 and 2 until said cable modem's transmitted signal arrives at said CMTS at the required power;

3) if after reaching its maximum power available, a cable modem's upstream transmissions still do not arrive at said CMTS at the required power level, subdividing said cable modem into a subgroup comprised of all modems of the same type and whose signals do not arrive at said CMTS at the required power level despite each said modem in said subgroup transmitting at the maximum available power;

4) generating a UCD message for a new logical upstream to which said modems in said subgroup will be assigned, said UCD message

establishing a burst profile for said new logical upstream which is sufficiently robust in its forward error correction, modulation type, symbol rate and/or other burst parameters such that modems in said subgroup can transmit upstream with an acceptable error rate.

22. The apparatus of claim 20 wherein said control computer is further programmed to carry out the steps of:

monitoring the received power of each CM during initial training thereof, and, for any CM which has inadequate received power after a plurality of attempts to adjust transmit power of said CM have failed to cause said CM's signal to arrive at said CMTS with adequate received power, causing said CM to switch to an upstream channel with a burst profile which is compatible with the CM modem type and suitable for adequate communications of digital data between said CMTS and CM despite said power shortfall problem.

23. The apparatus of claim 20 wherein said control computer is further programmed to carry out the steps of:

monitoring one or more of the following parameters of communication of data from each CM: the received power; the signal to noise ratio; the bit error rate; the byte error rate; the Reed-Solomon codeword error rate; and the packet error rate;

if performance of any CM becomes either too good or too bad, as measured by comparing the monitored parameter for said CM to limits that establish what performance level is too good or too bad, sending a message to said CM to cause it to change to an upstream channel which has a burst profile which is suitable for the CM's performance, and creating

an new upstream channel with suitable burst profile if necessary to which said CM whose performance is too good or too bad may be changed.

24. The apparatus of claim 20 wherein said CMTS has line cards which receive upstream signals from upstreams on a plurality of data paths from different cable nodes, and wherein said line cards have switches therein controlled by said CMTS to gate bursts from said plurality of data paths to a controller, and wherein control computer is further programmed to control said switch of any line card coupled to a cable upon which a TDMA burst is expected to turn on during a gap before said TDMA burst and turn off during a gap after said TDMA burst and to keep all other switches of other line cards turned off such that only said expected burst is gated through to said combiner, and wherein said control computer is further programmed to control the switch of any line card coupled to a cable upon which an SCDMA burst is expected to turn on during the ramp up of said SCDMA burst and to turn off during a ramp down of said SCDMA burst and to control other switches of other line cards to behave in the same way for expected SCDMA bursts on cables coupled to said other line cards.